PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B41C 1/10 — A1

(11) International Publication Number: WO 97/49557

(43) International Publication Date: 31 December 1997 (31.12.97)

(21) International Application Number: PCT/GB97/01522

(22) International Filing Date: 6 June 1997 (06.06.97)

(30) Priority Data:
9612233.8 12 June 1996 (12.06.96) GB

(71) Applicant *(for all designated States except US)*: HORSELL GRAPHIC INDUSTRIES LIMITED [GB/GB]; Howley Park Estate, Morley, Leeds LS27 0QT (GB).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: BENNETT, Peter, Andrew, Reath [GB/GB]; 15 Apley Close, Harrogate, N. Yorks HG2 8PS (GB). SMITH, Carole-Anne [GB/GB]; 26 Pawson Street, Morley, Leeds LS27 0QA (GB). BAYES, Stuart [GB/GB]; 10 Chatsworth Mews, Morley, Leeds LS27 8AB (GB). RILEY, David, Stephen [GB/GB]; 8 Reedsdale Drive, Gildersome, Leeds LS27 7JG (GB).

(74) Agent: MATTHEWS, Richard, Nordon; Ilford Ltd., Town Lane, Mobberley, Knutsford, Cheshire WA16 7JL (GB).

(81) Designated States: AU, CA, CN, CZ, GB, IL, JP, KR, NO, NZ, PL, RU, US, VN, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: LITHOGRAPHIC PLATES

(57) Abstract

There is described a method of preparing a printing form which comprises coating on a lithographic support having a hydrophilic surface, a layer of a radiation sensitive ink, imaging the ink coating by digital means, then acting on the plate with aqueous dampening rollers to remove the unexposed areas of the ink coating to reveal the hydrophilic surface of the plate and to leave an ink image formed from the ink, which is oleophilic after exposure.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

LITHOGRAPHIC PLATES

This invention relates to a digital printing method and especially to a method for preparing an imaged lithographic plate on-or-off press using a digitally controlled laser output.

Currently the commonest method of preparing a lithographic plate is to image a photosensitive lithographic plate using an image mask. such as a photographic negative. and to prepare the plate therefrom using an aqueous developing solution. This procedure is time consuming and requires facilities and equipment to support the necessary chemistry.

Thus recently. various methods have been proposed for preparing lithographic plates on the press which is to be used to produce prints from the plate. These methods prepare the image using a digitally controlled laser image head. As described in E.P.A. 580393 such methods include ink-jet methods digitally controlled, spark-discharge . methods and the production of electromagnetic-radiation pulses that create chemical changes of the plate blank. Also etching methods have been described as well as blank plates which are ablated by the laser to form an ink-receptive image.

We have discovered a novel method of preparing a printing form using a digitally controlled laser output from an imaging head which may be employed on-or-off a press.

According to the present invention there is provided a method of preparing a printing form which comprises coating on a lithographic support having a hydrophilic surface a layer of a radiation sensitive ink. imaging the ink coating by digital laser means. then acting on the plate with aqueous dampening rollers to remove the unexposed areas of the ink coating to reveal the

hydrophilic surface of the support and to leave an ink image formed from the ink. which is oleophilic after exposure.

The support is a material suitable for use on lithographic presses and may be metal. plastic or paper. Typical metals are aluminium. chromium or steel. Typical plastics are polyethylene terephthalate or polycarbonate.

The surface of the lithographic support is suitably treated to render it hydrophilic and adherent for the ink. Thus it may be anodised aluminium. chromium or it may be of a plastics material which is either hydrophilic or which has been treated to render it hydrophilic. for example polyethylene terephthalate coated with hydrophilic layers as described in our PCT Application GB96 02883 and WO94/18005 (Agfa).

Most preferably the support is metal and this is in the form of a sleeve or cylinder which fits on to a printing press. Most preferably the method of the present invention is carried out in situ in a printing press. Thus the printing press comprises an ink train which when the metal sleeve is mounted on the press can be lowered to coat on the sleeve an ink coating of a required thickness. together with a digital laser imaging head. means to disengage the metal sleeve from the printing press and to rotate it at a speed suitable for imaging. and water dampening rollers.

A preferred method for the use of flexible lithographic supports is to have a roll of the hydrophilic support within the press which when new material is required dispenses the new substrate and recoils the used substrate automatically. Such a system is utilised commercially in the Heidelberg Quickmaster DI press and on-press imaging system. In such a system all operations are carried out in-situ on the press with the exception of occasional renewal of the roll of hydrophilic support material.

Means are present in the ink-train to coat any required thickness of ink on the metal sleeve. For example for a lower run length an ink thickness of 0.1 to 0.5 microns is suitable. But for a higher run length a thickness of 3 microns is suitable.

The digital laser imaging head is in essence an image setter attached to the printing press and comprises a laser which scans in an imagewise manner radiation across the plate in response to image signals stored in a computer.

The laser may emit in the U.V waveband. as white light or preferably in the infra-red region of the spectrum.

Preferably the radiation sensitive ink comprises a radiation absorbing material which allows the ink to be sensitive to the wavelength of the radiation emitted by the image scanning means.

Conveniently the scanning means is a laser beam having a wavelength of above 600nm. Usefully the radiation sensitive ink comprises an infra-red absorbing compound. Suitable infra-red absorbing compounds include pigments such as phthalocyanine pigments or dyes of the following classes. squarylium, cyanine. merocyanine. indolizine. pyrylinium or metal dithiolene dye.

Preferably the infra-red absorbing compound is one whose absorption spectrum is significant at the wavelength output of the laser which is to be used in the method of the present invention. For example gallium arsenide diode lasers emit at 830nm and Nd YAG lasers emit at 1064nm.

Carbon black is also a useful radiation absorbing compound and in the context of this invention it can also be used as the colourant for the black radiation sensitive ink.

Preferably the radiation sensitive ink comprises a radiation sensitive resin which hardens or cross-links when irradiated. Suitable radiation sensitive resins are certain acrylate resins. for example polyether acrylate. epoxy acrylate. and alkyl acrylate. Suitable solvents for example styrene or methyl acrylate may also be present as well as a photopolymerisation initiator such as benzophenone or p-dialkyl-aminobenzoic acid.

Preferably the dampening rollers are covered with a lithographic fount solution.

Thus in the preferred method of the present invention a metal sleeve or cylinder which has a hydrophilic surface and which forms part of the printing surface of a printing press is coated with a predetermined thickness of a radiation sensitive ink. the metal sleeve is disengaged from the roller drive of the printing press and is caused to rotate at a speed suitable for imaging. the digital laser head attached to the printing press images the ink layer on the metal sleeve. after imaging the metal sleeve is re-engaged to the roller drive of the printing press and the rollers of the press rotate and act as water-dampening rollers. thus removing the unexposed areas of the ink on the surface of the sleeve and to reveal the hydrophilic surface of the sleeve in the unexposed areas of the sleeve. the rollers of the press are then inked up and the printing press prints on to paper fed to it. After the print run has finished a plate washer can be employed to remove all the ink from the sleeve which can then be re-used.

Preferably the metal sleeve can be removed from the press to clean it thoroughly and also to renew it periodically.

Preferably details of the required film thickness to be coated on the sleeve are fed directly into the laser imaging head which is programmed to adjust incident power and scanning speed to provide the optimum cure and imaging resolution.

Conveniently the same radiation sensitive ink is used to form the initial coating on the metal sleeve and in the actual print run. Thus ensures that the ink used in the print run will have a high affinity for the image areas.

Some advantages of the proposed method of the present invention are that only the film thickness necessary to do the job need be employed which in turn means recording time is minimised. This means for this system that make ready time is directly proportional to run length which is exactly what is required for a Direct-to-Press system, i.e. make ready time reduces as run length reduces in cases where imaging power is constant.

The digital inking controls can be arranged to communicate with the digital head allowing feedback loops to ensure maximum added value in terms of make-ready.

The idea of a removable sleeve is beneficial in case the surface becomes scratched and a spare can be used. It may also be possible to have them conditioned on a maintenance basis for optimum hydrophilicity.

Testing sensitivity of coatings

The coated substrate to be imaged was cut into a circle of 105mm diameter and placed on a disc that could be rotated at constant speed at between 100 and 2500 revolutions per minute. Adjacent to the spinning disc a translating table held the source of the laser beam so that the laser beam impinged normal to the coated substrate. while the translating table moved the laser beam radially in a linear fashion with respect to the spinning disc.

The laser used was a single mode 830nm wavelength 200mW laser diode which was focused to a 10 micron resolution. The laser power supply was a stabilised constant current source.

The exposed image was in the form of a spiral whereby the image in the centre of the spiral represented slower scanning speed and long exposure time and the outer edge of the spiral represented fast scanning speed and short exposure time. Imaging energies were derived from the measurement of the diameter at which the image was formed.

The diameter of the spiral can be equated to mJ/cm^2 in terms of pixel energy density. The minimum energy that can be delivered by this exposure system is 150mJ cm^2 at an rpm of 2500. These sensitivities are quoted in the Examples which follow: the higher the figure the less the sensitivity.

In the Examples commercially available black inks all containing carbon black were used.

EXAMPLE 1 Heat Set Ink

Gibbons Heat Set Black Ink (Gibbons Inks and Coatings Limited) was coated onto discs of grained and anodised aluminium using a rubber inking roller to give a wet ink film weight of 7.0 to 9.0 g/m^2.

The coated disc was imaged with a 200mW, 830nm. near infrared laser source at various speeds to give a range of energy densities incident on the coating's surface.

The disc was then developed by application of a 2% solution of Emerald fountain solution (Anchor Pressroom Chemicals) in water and rubbing this with cotton wool to remove the unexposed ink coating leaving behind the exposed coating areas.

The typical sensitivity obtained with this system was 1850 mJ/cm^2 pixel energy density.

EXAMPLE 2 Metal UV Cure Ink

Example 1 was repeated using Eurocure MD UV SPX190 Black ink (Edward Marsden Inks) to give wet ink coating weights from 2.5 to 6.5 g/m^2 and a typical sensitivity of 4900 mJ/cm^2 in terms of pixel energy density.

EXAMPLE 3 UV Cure Ink

Example 1 was repeated using Coates UV Cure Black Ink (Coates-Lorillaux) to give wet ink coating weights from 4 to 7g/m^2 and a typical sensitivity of 2700 mJ/cm^2 pixel energy density.

EXAMPLE 4 Metal Heat Set Ink

Example 1 was repeated using Diaflex Van Dyke Black TP Ink (Heat set type, Edward Marsden Inks) to give wet ink coating weights of 4 to 5.5 g/m^2 and a typical sensitivity of 1850 mJ/cm^2 pixel energy density.

EXAMPLE 5 Heat Set Ink On Silicated Substrate

Example 1 was repeated on a grained, anodised and silicated aluminium substrate.

The typical coating weight was 7 to 9 g/m^2 and the sensitivity seen was 1850 mJ/cm^2.

Method For Production Of Silicated Substrate

Grained and anodised aluminium substrate with a phosphate post anodic treatment was immersed for 30 seconds in an aqueous, 3% solution of sodium silicate heated to 50°C. On removal the substrate was washed under cold tap water and finally dried for 5 minutes at 80°C.

EXAMPLE 6 Heat Set Ink With Added Infrared Dye KF646 PINA

Example 1 was repeated except an infrared absorbing dye: Sensitiser KF646 PINA (Riedel de Haen AG), was added to the ink to increase its infrared sensitivity.

Formulation: 0.3g of thermal set black ink

0.18g of 3.2% Sensitiser KF646 in methoxy propanol.

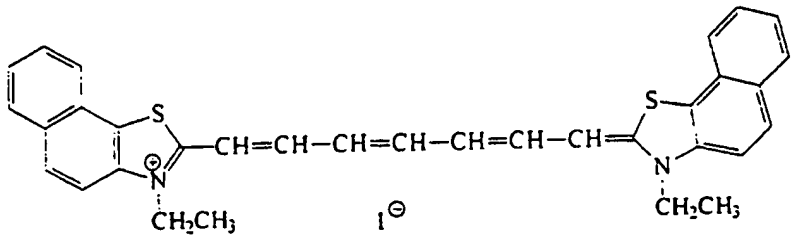
This formulation was mixed with a palette knife and then applied to discs of substrate, imaged and developed as in previous examples.

Typical wet ink coating weights were from 3 to 10 g/m^2, giving a sensitivity of 1700 mJ/cm^2 when optimised.

EXAMPLE 7 Heat Set Ink With Added Infrared Dye NK 1887

Example 6 was repeated except the infrared absorbing dye used was NK 1887 (supplied by Nippon Kankoh-Shikiso Kenkyusho) at 3.2% w/w in dimethylformamide.

Dye NK1887 is:-



3-Ethyl-2-{7(3-ethyl-naphtho{2.1-d}-thiazolinylidene)-1.3.5-heptatrienyl] naphtho[2.1-d]-thiazolium iodide.

Typical coating weights applied were from 2.5 to 5 g/m^2 giving a sensitivity of 1350 mJ/cm^2, when optimised.

EXAMPLE 8 UV Ink with Added Infrared Dye KF646 PINA

The Coates UV cure black ink was mixed with Sensitiser KF646 PINA as in the below formulation:

0.3g Coates IV cure black ink.

0.18g of KF646 PINA at 3.2% in methoxy propanol.

The formulation was blended using a palette knife and applied to substrate discs with a rubber inking roller. then imaged and developed as in previous examples.

Coating weights of 2 to 5 g/m^2 were obtained giving an optimised sensitivity of 1100 mJ/cm^2.

EXAMPLE 9 UV Cure Ink With Added Infrared Dye NK1887

Example 8 was repeated substituting the NK 1887 infrared dye for the KF646 PINA.

Wet coating weights of 2 to 4 g/m^2 were obtained. giving a sensitivity of 1500 mJ/cm^2 pixel energy density.

EXAMPLE 10 Heat Set Ink With Sensitiser KF646 On Silicated Substrate

Example 6 was repeated on silicated substrate.

Typical wet coating weights of 3 to 5.5 g/m^2 were examined giving a sensitivity of 1100 mJ/cm^2.

EXAMPLE 11 Heat Set Ink with NK1887 Infrared Dye on Silicated Substrate

Example 7 was repeated on silicated substrate. giving wet coating weights of 2.5 to 5g/m^2 and sensitivities around 1370 mJ/cm^2 pixel energy density.

EXAMPLE 12 UV Ink with Sensitiser KF646 PINA on Silicated Substrate

Example 8 was repeated on silicated substrate.

Wet ink coating weights of 3 to 5g/m^2 were found to give sensitivities around 1360 mJ/cm^2 when optimised.

EXAMPLE 13 UV Cure Ink With Acid Generator (Triazine)

The acid generating triazine 2(4-phenylthiomethyl)-4,5-trichloromethyl -s-triazine was mixed at 3% by weight with U.V. cure ink as follows:

0.4g Coates UV Cure Black Ink
0.3g triazine at 4% w/w in methyl ethyl ketone

The mixture was blended with a palette knife and applied to substrate discs then imaged and developed as in previous examples.

Coating weights of 2.5 to 4 g/m^2 were obtained and sensitivities of around 1300mJ/cm^2 obtained.

In the Examples above, dye KF646 was supplied by Riedel de Haen. It is a benzthiazole based heptamethine cyanine dye. λ_{max} 792nm in MeOH.

EXAMPLE 14

Example 6 was repeated using a reduced coating weight on a silicated support. the coated plate was imaged in a horizontal bed image setter as described below.

A form to be imaged was cut into a sample of 262 by 459mm and placed on a flat metallic bed. Suspended above the sample was a laser scanning system which directed a focused laser beam over the sample surface by means of XY scanning mirror (two galvanometer scanning mirrors in orthogonal planes). The included scan angle of this system was 40^0 capable of scanning up to 7 rad s^{-1} (or 850 mm s^{-1} at the focal plane). The image to be exposed could be chosen from any image capable of being converted into vector co-ordinates via a CAD package, this including images raster scanned onto the sample surface. The scan speed and dwell time of the laser were selectable by the operator using the scanner's control software in order to obtain various imaging energy densities.

The laser diode used was a single mode 830nm wavelength 200mW laser diode which was collimated and then focused. after reflection by the XY scanning mirrors. to do a 10 micron spot at the $1/e^2$ points. The laser power supply was a stabilised constant current source.

The coating weights of from 1.2 to 2.1g/m^2 were tested giving a sensitivity of around 450mJ/cm^2.

EXAMPLE 15.

The acid generating triazine 2(4-phenylthiomethyl)-4.5-trichloromethyl-s -triazine was mixed at 3% weight to weight with U.V cure ink as follows:

0.4g Coates UV Cure Black Ink

0.3g triazine at 4% w/w in methyl ethyl ketone

The mixture was blended with a palette knife and applied to substrate then imaged on the horizontal bed image setter as described above.

Coating weights of 1.3 to 1.7 g/m^2 were used and sensitivities of around 700mJ/cm^2 obtained.

EXAMPLE 16.

0.3g of Gibbons Heat Set Black Ink (Gibbons Inks and Coatings Limited) was mixed with 0.18g of 3.2% w/w NK 1887 (supplied by Nippon Kankoh-Shikiso Kenkyusho) in dimethylformamide using a palette knife. The mixture was coated onto grained and anodised aluminium using a rubber inking roller to give a wet ink film weight of 1.2 to 2.0g/m^2. The coated plate was imaged on the horizontal bed image setter as described above. The plate was then developed by application of a 2% solution of Emerald fountain solution (Anchor Pressroom Chemicals) in water and rubbing this with cotton wool to remove the unexposed ink coating leaving behind the exposed coating areas. The typical sensitivity obtained with this system was 750mJ/cm^2.

After development. the plate was mounted on a Heidelberg Speedmaster 52 printing press and printed copies produced. During this runlength test. at least 10.000 copies were obtained from this plate.

Even though some of the above listed inks are stated to be U.V. sensitive they are all infra-red sensitive as they contain carbon black.

It is to be understood that it is not necessary to coat the plate for the printing step with the same ink as used in the imaging step. Any other black or other coloured ink can be used.

Claims:-

1. A method of preparing a printing form which comprises coating on a lithographic support having a hydrophilic surface a layer of a radiation sensitive ink. imaging the ink coating by digital laser means. then acting on the support with aqueous covered dampening rollers to remove the unexposed areas of the ink coating to reveal the hydrophilic surface of the support and to leave an image formed from the ink. which is oleophilic after exposure.

2. A method according to claim 1 wherein the dampening rollers are covered with lithographic fount solution.

3. A method according to claim 1 wherein the surface of the lithographic support is anodised aluminium. chromium or suitable treated plastics material.

4. A method according to claim 1 wherein the lithographic support is a sleeve or cylinder which fits on to a printing press.

5. A method according to claim 1 wherein the method as claimed is carried out in situ in a printing press.

6. A method according to claim 1 wherein the laser emits radiation above 600 nm.

7. A method according to claim 1 wherein the ink is sensitive to infra-red radiation. UV radiation or visible light.

8. A method according to claim 7 wherein the ink comprises a radiation absorbing material.

9. A method according to claim 8 wherein the radiation absorbing compound absorbs radiation above 600 nm.

10. A method according to claim 9 where the radiation absorbing compound is selected from a dye or pigment.

11. A method according to claim 10 wherein the pigment is a phthalocyanine pigment.

12. A method according to claim 10 wherein the dye is selected from one of the following classes. squarylium, merocyanine, cyanine. indolizine, pyrylium or metal dithioline.

13. A method according to claim 8 wherein the ink comprises carbon black as a radiation absorbing material.

14. A method according to claim 13 wherein the ink also comprises an infra-red absorbing dye.

15. A method according to claim 1 wherein the ink comprises a radiation sensitive resin.

16. A method according to claim 15 wherein the radiation sensitive resin hardens or crosslinks on exposure to radiation.

17. A method according to claim 16 wherein the resin is selected from acrylate resins.

18. A method according to claim 16 wherein the ink comprises a polymerisation initiator.

19. A method according to claim 18 wherein the polymerisation initiator is photolytically decomposed on exposure to suitable radiation.

20. A method according to claim 18 wherein the radiation initiator is thermally decomposed on exposure to suitable radiation.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 97/01522

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B41C1/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B41C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	DE 43 41 567 A (HEIDELBERGER DRUCKMASCH AG) 8 June 1995 see the whole document ---	1-17 1-17
X	HONABLEW J.: "Large-format, full-resolution digital laser platemaking. A new experience" HIGH SPEED READ/WRITE TECHNIQUES FOR ADANCED PRINTING AND DATA HANDLING, PROCEEDINGS OF THE SPIE- THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING, 1983, USA, vol. 390, 20 - 21 January 1983, LOS ANGELES, CA, USA, pages 111-115, XP002041353	1
Y	see the whole document --- -/--	1-17

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

2

Date of the actual completion of the international search	Date of mailing of the international search report
22 September 1997	06. 11. 97

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+ 31-70) 340-3016	Rasschaert, A

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 97/01522

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AN.: "LA SURFACE SENSIBLE SANS AUCUNE CHIMIE" CARACTERE, vol. 46, no. 410, 26 September 1995, page 26 XP000533492	1-17
Y	see the whole document	1-17
X	EP 0 164 128 A (FROMSON H A) 11 December 1985 see the whole document	7-20
Y	EP 0 703 499 A (MINNESOTA MINING & MFG) 27 March 1996 see the whole document	1-17
P,X	EP 0 764 522 A (SUN CHEMICAL CORP) 26 March 1997 see the whole document	1
P,X	WO 97 00777 A (SUN CHEMICAL CORP) 9 January 1997 see the whole document	1
P,X	EP 0 768 172 A (AGFA GEVAERT NV) 16 April 1997 see the whole document	1-17
P,X	EP 0 769 724 A (AGFA GEVAERT NV) 23 April 1997 see the whole document	1-17
P,X	DE 196 12 927 A (CREO PRODUCTS INC) 21 November 1996 see the whole document	1-17

2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 97/01522

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4341567 A	08-06-95	GB 2284684 A	14-06-95
EP 0164128 A	11-12-85	CA 1249944 A	14-02-89
		JP 61018960 A	27-01-86
		US 4731317 A	15-03-88
EP 0703499 A	27-03-96	US 5506090 A	09-04-96
		CN 1141444 A	29-01-97
		JP 8114922 A	07-05-96
EP 0764522 A	26-03-97	CA 2186177 A	23-03-97
WO 9700777 A	09-01-97	CA 2198208 A	09-01-97
		EP 0788435 A	13-08-97
		JP 9001917 A	07-01-97
EP 0768172 A	16-04-97	NONE	
EP 0769724 A	23-04-97	NONE	
DE 19612927 A	21-11-96	NONE	